

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte FRANK RICHTER,
JOSEF PEDAIN, KLAUS KACHITKAMP
and ANDREAS FLINK

Appeal No. 1999-1008
Application 08/713,905

ON BRIEF

MAILED

AUG 30 2001

**PAT. & T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES**

Before PAK, WARREN and OWENS, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

Decision on Appeal

This is an appeal under 35 U.S.C. § 134 from the decision of the examiner finally rejecting claims 1 through 4, all of the claims in the application. Claims 1 and 3, as they stand of record,¹ are illustrative of the claims on appeal:

1. A process for the production of an ether (poly)isocyanate from an ether (poly)amine comprising reacting

a) an ether (poly)amine

with at least a stoichiometric amount (based on the number of primary amine groups present in a)) of

¹ See the amendment of May 12, 1997 (Paper No. 6).

b) phosgene or a compound which generates phosgene under the reaction conditions in the vapor phase at a temperature of from about 50 to about 800°C under pressure.

3. An ether isocyanate selected from the group consisting of 2-(2-isocyanate-propoxy)-1-propyl isocyanate, 1,1'-oxydi-2-propyl isocyanate, 2,2'-oxydi-1-propyl isocyanate and mixtures thereof having a hydrolyzable chlorine content of less than 0.1%.

Appealed claims 1 and 2 as represented by claim 1, are drawn to a process comprising reacting an ether (poly)amine with at least a stoichiometric amount of phosgene, or a phosgene generating compound, in the vapor phase at a temperature in the specified range and under pressure to obtain the ether (poly)isocyanate. Appealed claim 3 is drawn to one of or mixtures of the three specified ether isocyanates which compounds and mixtures have a hydrolyzable chlorine content of less than 0.1%, which ether isocyanate products are used in the process of producing a urethane specified in claim 4.

The references relied on by the examiner are:

Lehmann et al. (Lehmann)	3,267,122	Aug. 16, 1966
Joulak et al. (Joulak)	5,391,683	Feb. 21, 1995
Biskup et al. (Biskup)	5,449,818	Sep. 12, 1995
Bischof et al. (Bischof)	5,516,935	May 14, 1996

The examiner has rejected appealed claims 1 and 2² under 35 U.S.C. § 103(a) as being unpatentable over Lehmann in view of Joulak or Biskup or Bischof (answer, pages 5-7). The examiner has rejected appealed claims 3 and 4 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention (*id.*, pages 3-4).

Appellants state in their brief (page 3) that in view of the separate grounds of rejection,

² Claim 2, as it stands of record (*see above* note 1), contains error in chemical formula (I) used to defining "ether (poly)amine a)" because the definitions of *all* of formula members and subscript "n" will not generate a polyamine when "n represents 1, 2 or 3" and "X represents H . . . or C(R³)_{4-n}" and when "n represents . . . 2 or 3" and "X represents . . . NH₂" unless one of "R¹, R² and R³" is "optionally substituted" by an amino group, that is not otherwise expressly provided for, and the only substituent "R" that can form "a direct bond of X to the ether oxygen atom bonded to R²" is "R¹" as originally presented and not any "R" as now specified. These errors should be consider with respect to whether claim 2 complies with 35 U.S.C. § 112, second paragraph, upon any further prosecution of this claim before the examiner.

claims 1 and 2 and claims 3 and 4 "do not therefore stand or fall together." Thus, we decide this appeal based on appealed claims 1 and 3 as representative of the respective grounds of rejection. 37 CFR § 1.192(c)(7) (1997).

We affirm both grounds of rejection.

Rather than reiterate the respective positions advanced by the examiner and appellants, we refer to the examiner's answer and to appellants' brief for a complete exposition thereof.

Opinion

Considering first the ground of rejection of appealed claim 1 under § 103(a), the examiner has taken the position that although Lehmann does not disclose the phosgenation of the specified ether polyamine to obtain the corresponding ether (poly)isocyanate in vapor phase, it would have been *prima facie* obvious to one of ordinary skill in this art to conduct the phosgenation of the specific ether (poly)amines of Lehmann in the vapor phase from the combined teachings of this reference, Joulak, Biskup and Bischof, which latter three references teach the phosgenation of polyamines in the vapor phase (answer, page 5).

We find that Lehman would have disclosed to one of ordinary skill in this art that, contrary to the teachings of the prior art which would expect ether cleavage products to be formed during the phosgenation of ether (poly)amines to the corresponding isocyanate (col. 1, lines 15-28 and 56-62), the phosgenation of the specified ether (poly)amines by known methods will form desirable yields of the isocyanate with little if any cleavage (e.g., col. 1, lines 29-56 and 62-71, and col. 2, 16-33). Lehmann teaches a number of processes, specifying only that the phosgenation process is conducted "at a temperature up to about 200° C" (Lehman claim 4), and exemplifies carrying out the process in an inert solvent (Lehman Examples and Lehmann claim 5). While Lehmann does not specifically so state, one of ordinary skill in this art would have recognized from the reference that the processes of the reference are conducted under at least atmospheric pressure, not in a vacuum. Joulak discloses that the phosgenation of aromatic (poly)amines to the corresponding isocyanates can be conducted with an excess of phosgene in the vapor phase with an inert, diluent carrier gas at a temperature which "advantageously ranges from 250° to 500° C" and under pressure (cols. 1-4). The inert, diluent carrier gases used by Joulak (col. 2, lines 46-51) correspond to several of the solvents used by Lehmann. Biskup

teaches that the phosgenation of aromatic diamines to the corresponding aromatic diisocyanates can be conducted with an excess of phosgene in the vapor phase with an inert, diluent carrier gas at a temperature above the boiling point of the diamine, generally from 200° to 600° C and under pressure (cols. 1-5). The inert, diluent carrier gases used by Biskup (col. 3, lines 1-6) correspond to several of the solvents used by Lehmann. Bischof discloses that the phosgenation of aliphatic and cycloaliphatic diamines to the corresponding diisocyanates can be conducted with an excess of phosgene in the vapor phase with an inert, diluent carrier gas at a temperature of from 200° to 600° C and under pressure (cols. 1-4). The inert, diluent carrier gases used by Bischof (col. 3, lines 19-28) correspond to several of the solvents used by Lehmann.

The plain language of appealed claim 1, when considered in light of the written description in the specification as interpreted by one of ordinary skill in this art, *see, e.g., In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997), requires only that any ether (poly)amine is phosgenated with at least a stoichiometric amount of phosgene in the vapor phase at a temperature of from about 50 to about 800°C under at least some pressure. We find that, based on the evidence in the combined teachings of Lehmann, Joulak, Biskup and Bischof, *prima facie*, one of ordinary skill in this art would have found therein the suggestion to conduct the phosgenation of the ether (poly)amine of Lehmann in the vapor phase in an excess of phosgene, using the same solvents taught by Lehmann as the inert carrier gas, and at 200°C under pressure, with the reasonable expectation of obtaining the corresponding ether (poly)isocyanate with a reduced amount of ether cleavage products. Accordingly, we determine that one of ordinary skill in this art following the combined teachings of the applied references would have routinely arrived at processes falling within appealed claim 1. *See, e.g., In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531-32 (Fed. Cir. 1988) ("The consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that [the claimed process] should be carried out and would have a reasonable likelihood of success viewed in light of the prior art. [Citations omitted] Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure."); *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981) ("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into

the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.”).

Appellants apparently agree with the examiner’s position as they make the admissions in the brief that one of ordinary skill in this art following the teachings of Lehmann and, individually, each one of Joulak (page 6, last paragraph), Biskup (page 9, first paragraph) and Bischof (page 10, fourth full paragraph), would have arrived at a process limited to the phosgenation of the specific ether (poly)amine of Lehman in the vapor phase. While appellants do modify their admissions with respect to Biskup and Bischof to some extent with the phrases “disregarding [Lehmann’s] teachings against the use of the high temperatures of Biskup” and “ignoring [Lehmann’s] teaching with respect to high temperatures,” respectively, we are convinced that one of ordinary skill in the art would have recognized that the lowest temperatures disclosed in each of these references, that is, 200°C, is the highest temperature disclosed by Lehmann, and thus would have conducted the vapor phase phosgenation of the ether (poly)amine of Lehman at least at this temperature.

Accordingly, on this record, the claimed process as encompassed by appealed claim 1 is *prima facie* obvious over the prior art applied by the examiner. We have carefully considered the arguments against the *prima facie* case advanced by appellants in the brief and reply brief but find them unpersuasive of the patentability of the claimed processes over the applied prior art. We recognize that the claimed processes encompassed by appealed claim 1 are not limited to the ether (poly)amines specifically required by Lehmann as starting materials. However, while the claimed process may be of broader scope in this respect, the fact remains that the process of phosgenating these specific ether (poly)amines as suggested by the applied prior art falls within appealed claim 1. Thus, appealed claim 1 reads on both obvious and nonobvious subject matter and therefore, it is too broad in the sense of § 103(a). *See, e.g., In re Muchmore*, 433 F.2d 824, 826, 167 USPQ 681, 683 (CCPA 1970).

We have carefully considered appellants’ contentions that the yields shown in the specification Examples are greater than those taught by Lehmann (brief, pages 7-8, 9 and 11). However, the processes of the specification Examples are not directed to the specific ether

(poly)amines of Lehmann or to an analogous ether (poly)amine, and the reaction temperature is well above the 200°C taught in this reference. The processes of the specification Examples are also conducted with considerably more parameters than specified in appealed claim 1, which we found above to require only the use of an excess of phosgene, a temperature range that encompasses 200°C and any amount of pressure. Appellants have provided no evidence or explanation on this record which establishes that the evidence in the specification Examples amounts to a direct or indirect comparison of the claimed process encompassed by appealed claim 1 with the applied prior art which addresses the thrust of the ground of rejection under § 103(a). *See generally, Baxter Travenol Labs. supra* ("[W]hen unexpected results are used as evidence of nonobviousness, the results must be shown to be unexpected compared to the closest prior art. [Citation omitted.]"); *In re Burckel*, 592 F.2d 1175, 1179, 201 USPQ 67, 71 (CCPA 1979); *In re Blondel*, 499 F.2d 1311, 1317, 182 USPQ 294, 298 (CCPA 1974). Moreover, to the extent that the limited evidence in the specification Examples pertains to the ground of rejection of appealed claim 1, it is certainly not commensurate with the vast scope of this claim. *Cf. In re Landgraf*, 436 F.2d 1046, 1050, 168 USPQ 595, 597 (CCPA 1971) ("[E]ven if we were to assume that the results which are indicated . . . would have been unexpected, we nevertheless find the limited evidence presented therein insufficient to convince us of the probability that comparable results would be attained with the totality of processes covered by the appealed claims.").

Therefore, based on our consideration of the totality of the record before us, we have again weighed the evidence of obviousness found in the combined teachings of Lehmann, Joulak, Biskup and Bischof with appellants' countervailing evidence of and argument for nonobviousness and conclude that the claimed invention encompassed by appealed claims 1 and 2 would have been obvious as a matter of law under 35 U.S.C. § 103(a). *See generally, In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); *In re Rinehart*, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

Turning now to the ground of rejection of appealed claim 3 under § 112, first paragraph, whether there is "support" in the specification for the claimed invention (answer, pages 3 and 4) involves the question of compliance with the written description requirement of this section of

the statute. *See, generally, Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1560, 19 USPQ2d 1111, 1114 (Fed. Cir. 1991). It is well settled that

[t]he function of the description requirement is to ensure that the inventor had possession, as of the filing date of the application relied on, of the specific subject matter later claimed by him; how the specification accomplishes this is not material. . . . It is not necessary that the application describe the claim limitations exactly, . . . but only so clearly that persons of ordinary skill in the art will recognize from the disclosure that appellants invented processes including those limitations. [Citations omitted.]

The primary consideration is *factual* and depends on the nature of the invention and the amount of knowledge imparted to those skilled in the art by the disclosure. . . .

In re Wertheim, 541 F.2d 257, 262-65, 191 USPQ 90, 96 (CCPA 1976); *see also Vas-Cath*, 935 F.2d at 1563-64, 19 USPQ2d at 1116-17. Appellants, in framing the specification, are under no requirement to "utilize any particular form of disclosure to describe the subject matter claimed." *In re Alton*, 76 F.3d 1168, 1172, 37 USPQ2d 1578, 1581 (Fed. Cir. 1996). Thus, the entire content of the specification, including the objects of the invention, must be considered in determining compliance with the written description requirement. *See, e.g., In re Wilder*, 736 F.2d 1516, 1520, 222 USPQ 369, 372-73 (Fed. Cir. 1984). However presented, the written description in the specification must "convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [appellants were] in possession of *the invention . . . now claimed*," *Vas-Cath*, 935 F.2d at 1563-64, 19 USPQ2d at 1117, which factual determination is made on a case-by-case basis. *Id.*, 935 F.2d at 1561, 19 USPQ2d at 1116. In order to make out a *prima facie* case that the appealed claims do not comply with this section of the statute, the examiner must set forth evidence or reasons why, as a matter of fact, persons skilled in this art would not reasonably recognize in the disclosure in the specification a description of the invention defined by the claims which establishes that appellants were in possession of the invention, including all of the limitations thereof, at the time the application was filed. *See generally, Alton*, 76 F.3d at 1175-76, 37 USPQ2d at 1583-84, citing *Wertheim*, 541 F.2d at 263-64, 191 USPQ at 97.

The claimed invention now encompassed by appealed claim 3 is three isomeric ether diisocyanate compounds, separately and in admixture, which products must have "a hydrolyzable

chlorine content of less than 0.1%" (emphasis supplied). In other words, in view of this claim limitation, the products must have a hydrolyzable chlorine content of less than 1000 parts per million (ppm), that is, no more than 999 ppm. The claim does not contain any limitations specifying the manner in which the claimed products are made, and thus is not a product-by-process claim. *See, e.g., In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985).

It is clear that the claimed invention is not described in *ipsis verbis* in the written description in the specification even though the examiner does not so state. It is also clear that the examiner has considered the entire written description in the specification in arriving at the position that the disclosure of specification Example 1 and the alleged corresponding specification Comparative Example alone "are not sufficient to provide support" for the subject claim limitation, noting that "appellants' only disclosure of hydrolyzable chlorine contents for instant invention stems from the examples; however, the disclosed amounts within the examples range from 24 ppm to 48 ppm" (answer, pages 3-4). The examiner finds no support for the claim limitation in the disclosure in the specification that no mixture prepared in the Comparative Example had a hydrolyzable chlorine content below 0.1% or in the "statements in the specification pertaining to the prior art and the hydrolyzable chlorine content of the prior art" products (answer, pages 3-4), thus referring to the paragraph bridging pages 1 and 2, and page 3, lines 22-26, of the specification.

In view of the *prima facie* case made out by the examiner, we have again reviewed all of the facts in the evidence of record bearing on the issue of written description, giving due consideration to the weight of appellants' arguments. *See Alton*, 76 F.3d at 1175-76, 37 USPQ2d at 1583-84. Appellants (brief, pages 3-4; see also reply brief, pages 2-3) point to specific parts of the written description in the specification which involve discussions of the prior art (specification, paragraph bridging pages 1-2), objects of the invention (*id.*, page 3, lines 17-18 and 22-25), the Examples and the Comparative Example, and submit that

[o]ne skill in the art reading Appellants' specification in its entirety would therefore readily appreciate that Appellants had indeed invented a *process* for producing isocyanates which do not have the high hydrolyzable chlorine contents known to be problematic in prior art processes (i.e., hydrolyzable chlorine contents of 0.1% or greater) at the time the present application was filed. [Brief, page 4; emphasis supplied.]

We have carefully compared the specific disclosure appellants rely on with other relevant parts of the written description. We find that appellants disclose in the written description of their specification that a mixture of the three isomeric ether isocyanates as claimed is "new" (page 7), and exemplify a vapor phase phosgenation process in specification Example 1 which produces such a mixture having "a content of hydrolyzable chlorine of 43 ppm" (page 8). The subject limitation was added by amendment to original claim 3 to obtain appealed claim 3.

Appellants further state that

[c]ertain ether isocyanates can be obtained in yields of up to about 80% by simple base phosgenation. (See, for example, DE-A 1,154,092.) *However, the products of such processes have very high residual chlorine contents (0.1%). Such a high chlorine content in the diisocyanate frequently makes it difficult to use those products. For example, such chlorine-containing diisocyanates are not useful for the preparation of non-discoloring raw materials for coatings. . . .* [*Id.*, page 1, line 26, to page 2, line 1; part relied on by appellants emphasized.]

Although not relied on in the brief or reply brief, appellants further state that

DE-A 1,793,329 discloses a cold phase-hot phase phosgenation in solution for the preparation of ether(poly)isocyanates. It is alleged that very little, if any, splitting of the ether occurs. However, the yields of isocyanate are only 60 to 75% of the theoretical yield. *The chlorine content of the products, at 400 to 2000 ppm, is far too high for many applications, particularly for paint and coating applications.* [Specification, page 3, lines 6-11; emphasis supplied.]

Appellants state as an object of the invention that "the *production* of high quality isocyanates containing ether groups" and that such object is "accomplished by converting mono- and polyamines containing ether groups to the corresponding isocyanates in very good yields and in high purity, without splitting the ether group" (*id.*, page 3, lines 17-18 and 22-25; emphasis supplied).

Although not relied on in the brief or reply brief, appellants further state that "[t]he ether isocyanates prepared by the process of the present invention are valuable raw materials for the production of . . . coating materials . . ." (specification, page 7, lines 11-13).

In each of specification Examples 2 through 5, a different single ether mono- or di-isocyanate compound, none encompassed by appealed claim 3, is produced by the process of specification Example 1, wherein the hydrolyzable chlorine content of the products ranges from 24 ppm to 48 ppm. In specification Comparative Example (page 10), "the mixture of diamines

specified in Example 1" was phosgenated in liquid phase in monochlorobenzene solvent by a process that was not attributed to any prior art reference (*cf. id.*, lines 27-29). The "reaction mixture" was described thusly:

It was not possible to achieve a complete elucidation of the reaction mixture. After blowing off of the excess phosgene with nitrogen, filtration and working up by distillation, 19.5 g (19.6% of the theoretical yield) of a slightly colored liquid was obtained, having a boiling range of 80 to 85°C/.07 mbar and an NCO content in accordance with DIN 53 185 of 45.2%. [*Id.*, lines 15-21.]

It is further disclosed that modifications in solvent and in starting material did not increase "the yield of diisocyanate substantially" and that "[t]he residual chlorine content of the product was in no case below 0.1%" (*id.*, lines 22-26).

In comparison, in specification Example 1, the reaction mixture is subjected to a number different processes in working up the product mixture to a purity of 99.7% and a content of hydrolyzable chlorine of 43 ppm (page 7, line 25, to page 8, line 29, particularly page 8, lines 16-24). We further note that appellants disclose in the specification that "[t]he process of the present invention may be carried out using known techniques," including several disclosed in the patent literature (page 4, lines 23-25), and that recovered ether isocyanate product can "be isolated in pure form by known processes such as distillation, crystallization, extraction or film distillation, or recovered as raw product (solution)" (page 5, lines 16-21).

Based on our review, we find that the written description in the specification in its entirety does not convey with reasonable clarity to one skilled in this art that appellants were in possession of the claimed ether diisocyanate *products* "having a hydrolyzable chlorine content of less than 0.1%" encompassed by appealed claim 3, when the application was filed. Indeed, while appellants indicate that unspecified "[c]ertain ether isocyanates" produced by an unspecified prior art base phosgenation process have "residual chlorine contents (0.1%)," that is, 1000 ppm, which is "very high" and not useful as "raw materials for coating," they have also described at least one specific prior art process as producing ether (poly)isocyanates at a hydrolyzable chlorine content as low as 400 ppm, which content is further described to be "far too high for many applications, particularly . . . coating compositions." Not only does the latter disclosure beg the question of what is an acceptable chlorine content for an ether isocyanate in ppm for

coating compositions to one skilled in this art if 400 ppm is far too high for that purpose, but it clearly establishes that, if the description in the specification is a correct reflection of the state of the art, one of ordinary skill in this art would not have considered an ether isocyanate having even 400 ppm of hydrolyzable chlorine to be a "high quality" isocyanate product produced by the *process* described in the specification.

Thus, we find that the written description would have reasonably conveyed to one skilled in this art the concept that the process disclosed in the specification would prepare ether mono- and polyisocyanates in the ppm range as shown in the specification examples. We are reinforced in our view by the distinct differences in process steps, particularly with respect to product workup, between specification Example 1 and the specification Comparative Example, and the clear message that the hydrolyzable chlorine content of 0.1%, that is, 1000 ppm, obtained for the unidentified product by the unidentified prior art process in the Comparative Example is highly undesirable compared to the double digit ppm range obtained with the disclosed process.

Accordingly, upon reconsideration of the facts in the evidence of record as a whole, we determine, as a matter of fact, that one skilled in this art would not have reasonably recognized in the disclosure of appellants' application as filed a description of the invention encompassed by appealed claims 3 and 4 which establishes that appellants were in possession of the claimed invention encompassed by appealed claims 3 and 4, including all of the limitations thereof, at the time the application was filed as required by § 112, first paragraph, written description requirement.


The examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

George B. Pl

CHUNG K. PAK
Administrative Patent Judge


CHARLES F. WARREN

CHARLES F. WARREN
Administrative Patent Judge

BOARD OF PATENT APPEALS AND INTERFERENCES

Terry J. Owens

TERRY J. OWENS
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